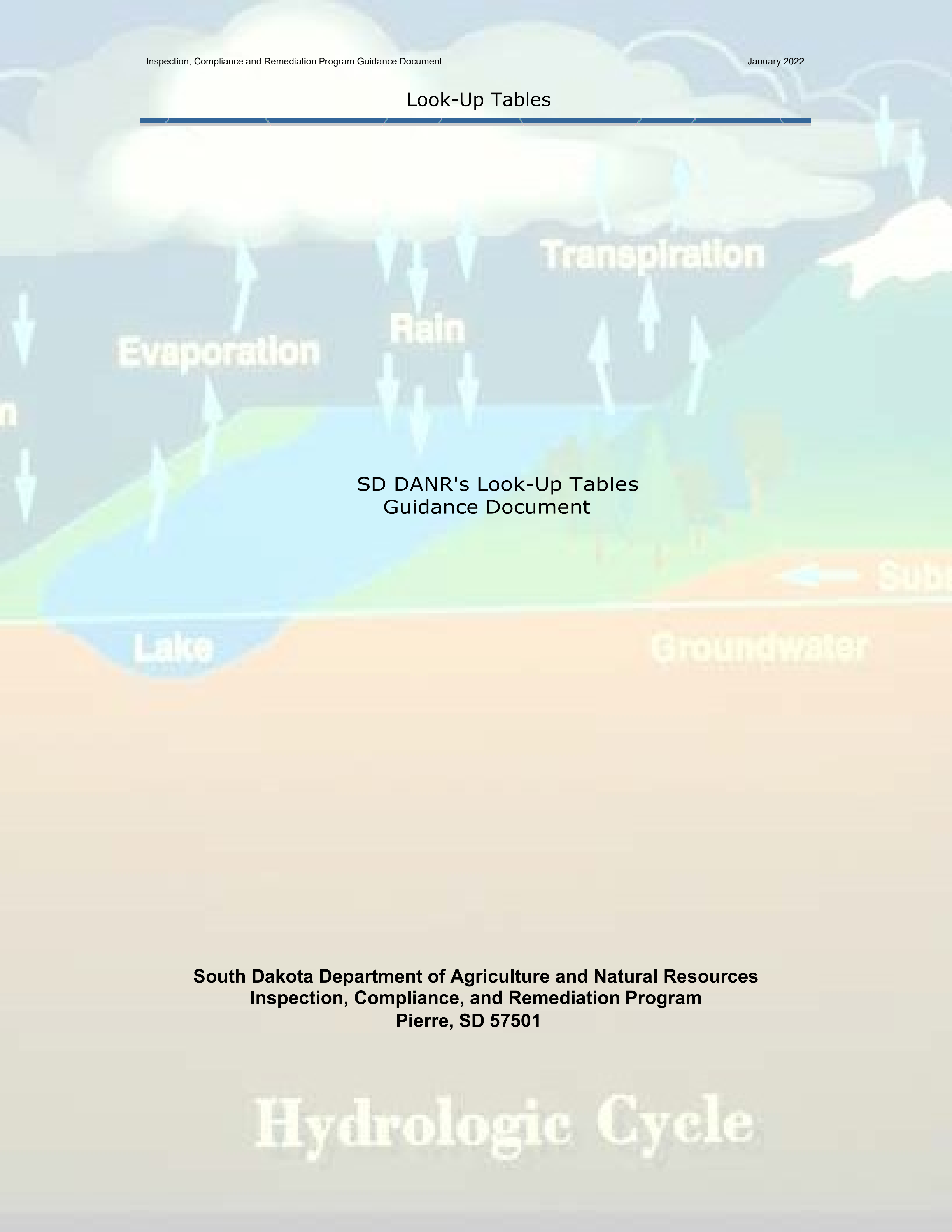


# SD DANR's Look-Up Tables Guidance Document

**South Dakota Department of Agriculture and Natural Resources**
**Inspection, Compliance, and Remediation Program**
**Pierre, SD 57501**

## SD DANR's Look-Up Tables

The South Dakota Department of Agriculture and Natural Resources has recently developed look-up tables with risk numbers for the different exposure pathways i,e., surface pathway, indoor air, and PVC water lines. The existing Tier 1 Action Levels numbers were calculated for contaminated soil leaching into ground water assuming that someone would be drinking the water. A single site or release may have several potential pathways endangering human health in addition to the ground water ingestion pathway. We are also aware that not every site is situated over an aquifer or has potable ground water. Therefore, the department has developed these look-up tables to conservatively eliminate those potential exposure pathways that are not posing risk to human health or environment. These look-up tables are intended to be use as first step in a Tier 2 assessment without performing additional fieldwork or using the RBCA software. The department believes the development of these risk numbers will streamline the review process.

## Guidance On How to Use Look-Up Tables

Implementing these look-up tables will require some changes in the way sites are assessed. Typically, soil samples are collected from soil borings and excavations at the water table, from the interval with the highest PID reading or from the bottom of the excavation. Samples of affected surface soil (zero to 3.2 feet below ground surface) are usually not collected if more heavily contaminated soil is present in subsurface soil. It now may be necessary to collect surface soil samples if PID readings from the surface soil exceed 50 ppm.

### If contaminant concentrations in soil exceed Tier 1 Action Levels/500 ppm TPH: Complete the SD DANR RBCA Site Conceptual Model Sheet, submit it as part of all reports,

- Identify source(s) (i.e., surface soil, subsurface soil, ground water)
- Identify transport mechanism(s) (i.e., wind erosion, volatilization, leaching, ground water transport)
- Identify exposure pathway(s) (i.e., direct contact, inhalation of vapors, ground water ingestion)
- Identify potential receptors (i.e., on-site commercial receptors, off-site residential receptors, environmental receptors)

### Once the potential receptors and pathways are identified, consult the appropriate Look-Up Table to see which pathways are of concern.

- If contaminated soil is present between zero and 3.2 feet below the ground surface (surface soil); check the Surface Soil Look-Up Table to see if there is a potential risk from surface soil (residential/commercial, construction worker).

- If the contaminated surface soil is covered with asphalt or concrete, the surface soil pathway can be eliminated.

- If contaminated soil is present between zero and nine feet below ground surface, check the Surface Soil Look-Up Table for construction workers to see if there is a potential risk to construction workers

- If contaminated soil OR contaminated ground water are under a building, check the appropriate Indoor Air Look-Up Table to see if there is a potential indoor air risk (see "Using Indoor Air Look-Up Tables" for additional guidance). If both contaminated soil AND contaminated ground water are under a building, do not use the lookup tables.

- If contaminated ground water and/or soil exceeding Tier 1 Action Levels are in contact with a water line, regardless of the construction, collect a tap water sample.

- If the composition of the water line is unknown and the tap water sample is non-detect, assume the water line is NOT polyethylene (PE) or polybutylene (PB); compare ground water concentrations to the Water Line Look-up Table to see if there is a potential risk to the water line.

## Guidance for Using Surface Soil Look-Up Table

<u>During a tank excavation</u>:

- Collect sample from the tank bottom. The purpose of this sampling is to document the tank has not leaked.

- If PID readings from the surface soil exceed 50 ppm, a surface soil sample must also be collected.

- Soil samples must also be collected along the product lines and under the pump islands.

<u>During initial site assessment</u>:

- If PID readings from surface soil exceed 50 ppm – collect <u>one</u> surface soil sample from the highest PID reading within that interval. For example, if three soil borings were advanced at the site and the PID readings from the three surface soil samples were 50 ppm, 70 ppm, and 65 ppm – submit the sample from the boring with highest PID reading (70 ppm) for laboratory analysis.

- Subsurface soil samples must <u>also</u> be collected from each boring at the highest PID reading in that interval, the bottom of the soil boring, or just above the water table.

- Soil samples must also be collected along the product lines and next to the pump islands.

## Guidance for Using Indoor Air Look-Up Tables

Data needs for selecting and using the air look-up tables:

- Condition of the basement/slab
- Area of the building (to select proper row in the table)
- Use of the building (commercial or residential) (to select proper row in the table)
- Depth to top of soil contamination (to select proper table)
- Depth to ground water (to select proper table)
- Maximum soil contamination under the building
- Maximum ground water contamination under the building

If soil and/or ground water contamination under a building exceeds Tier 1 Action Levels or Ground Water Quality Standards:

Assess the condition of the basement or slab

- If the basement or slab is in poor condition, DO NOT use the look-up tables. Collect an air sample. Conduct additional assessment as necessary (this may include running the RBCA software using site specific information and the software default crack fraction)

- If the basement or slab is in good condition, use the look-up tables to determine if there is the potential for vapor problems

- If concentrations exceed values on the look-up tables, collect an air sample. Conduct additional assessment as necessary (this may include running the RBCA software using site-specific information)

- If concentrations do not exceed values on the look-up tables, no additional assessment of indoor air is required

**The Look-Up tables are NOT to be used if both contaminated soil and ground water are under the building.** If both soil exceeding Tier 1 Action Levels and ground water exceeding MCLs are under the building, use the RBCA software, and site specific information, to calculate potential risk. If the calculated risk exceeds the cancer or non-cancer target risk levels:

- Collect an air sample,
- Perform additional assessment as necessary.

- If contamination/water table starts at five feet below ground surface – use Table 2;if contamination/water table starts at ten feet below ground surface – use Table 3, etc.

- If contaminated soil (particularly product-saturated soil) or ground water are in direct contact with the basement wall – check the basement for contamination directly entering the basement through cracks, sumps, etc.

- At sand to clayey sand sites; if soil contamination is deeper than 15 feet and/or groundwater is deeper than 20 feet and the concentrations exceed the values in the look-up tables, conduct additional Tier 2 Assessment to determine if there is actually a vapor risk to the building.

- Use the analytical results from the soil boring/monitoring well closest to the building; if more than one well near the building use the highest measured concentrations.

- If more than one soil type is present at the site, use the look-up table column corresponding to the coarsest-grained material. For example, if the site has interlayered sandy clay and silty sand, the correct screening value for the site is the one calculated for sand to clayey sand.

- The look-up tables can also be used to determine if there is potential for vapor problems if a structure is built on the site in the future.

- The top of soil contamination is the depth at which you first get PID readings greater than 10 ppm.

The RBCA software and the look-up tables assume the entire thickness of contaminated soil contains contamination at the concentrations measured in the sample from the highest PID reading. This may be a very conservative assumption. If contaminant concentrations exceed the values in the look-up table, additional assessment may consist of collecting soil samples at discreet intervals through the thickness of contaminated soil (for example, every one foot; every two feet). These concentrations would be used to calculate a representative concentration for the contaminated soil (calculate a weighted average). The sampling requirements are: a minimum of three samples from the boring; and the interval between samples cannot be greater than five feet.

## Guidance for Using Water Lines Look-Up Tables

Recommendations Concerning Water Line Sampling:

If soil above the Tier 1 action levels or ground water contamination above maximum contaminant levels (MCL) is adjacent to or in contact with a water line a tap sample must be collected. The suggested procedure for collecting a tap sample is as follows. The sample should be taken from a location (i.e., outside water tap) that is before any water treatment system such as a water softener, etc. After the water has been allowed to stand in the pipe for a minimum of 8 hours turn on the faucet slowly and immediately collect the sample in accordance with Standard Operating Procedure 4, Section 7.7, “Special Considerations for Volatile Organic

Compound Sampling" South Dakota's Handbook for Investigation and Corrective Action Requirements.

Free-Product in Contact with Water Lines:

Under no circumstance can free-product or product saturated soil be left in contact with a waterline. This applies to all water lines regardless of their material. The free-product must be removed or the waterline must be re-routed.

Recommendations Concerning Polyethylene (PE) and Polybutylene (PB) Water Lines:

A survey of pipe permeation incidents (University of California Study, January 1989) showed that polybutylene (PB) pipe was the major material involved (43%) in all incidents, followed by polyethylene (PE) pipe at 39%. The use of these materials for service line connections in the area of the survey was common. The Department does not have a good feel for how prevalent the use of these types of materials are in South Dakota. The survey also showed that the dominant contaminants (89%) were petroleum products such a gasoline and diesel fuel.

The concern with these materials is that the contaminant enters the pipe by straight diffusion (Fickian), which means there is no physical change to the pipe, such a softening. A review of the California study also shows that pipe permeation can occur with low soil contaminant concentrations (i.e., less 0.05 ppm toluene, less than 0.2 ppm xylenes/ethylbenzene and less than 4.1 ppm benzene). In almost all the surveyed cases the PB and PE was either replaced by copper or the water service line was routed around the contamination. For the above reasons the Department does not feel it is feasible to develop look-up tables for PB or PE pipe.

**Note:** The development of a look-up table for gasoline constituent (i.e., benzene, toluene, ethylbenzene, and xylenes) contaminated soil in contact with PVC water line is not feasible because it is necessary to know more site-specific information than just the concentration of the contaminants in soil. It has been shown that the relative organic chemical concentration in the soil pores controls the permeation rate. This requires the soil to be analyzed in such a way that the relative organic chemical concentration in the soil pores can be predicted. In order, to properly make this prediction site specific data such as soil organic carbon content, soil water content and soil porosity must be measured. For further discussion on the above analysis refer to the document published by the University of California at Berkley on Permeation of Plastic Pipes by Organic Chemicals, pages 303-305.